a16

40. (Amended) The dielectric substrate, according to claim 39, further comprising:
said dielectric substrate is constructed in a bulk form;
said dielectric substrate having a low dielectric constant of 14.6; and
said dielectric substrate having a low dielectric loss of less than 1.0×10^{-3}.

Sub B14

a17

43. (Amended) The dielectric substrate, according to claim 42, further comprising:
said dielectric substrate is constructed in a bulk form;
said dielectric substrate having a low dielectric constant of 10.6; and
said dielectric substrate having a low dielectric loss of 2.9×10^{-3}.

Sub B15

REMARKS

Claims 1-4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43 and 50 are now in the case. No new claims have been added to the case by virtue of this Amendment.

As required by 37 CFR § 1.121(b)(iii) and 37 CFR § 1.121(c)(ii), separate marked-up Specification Replacement Pages and Claim Replacement Pages are enclosed with this Amendment.

The Examiner rejected claims 1-4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43 and 50 under 35 USC § 103 as being obvious over an article by Fesenko, rejected claims 1-4, 6, 7, 18, 19, 24, 33, 34, 39, 40, 42, 43 and 50 as being obvious over an article by Wittmann et al. and rejected claims 1, 2, 30, 31 and 50 as being obvious over an article by Blasse.

Each rejection and response is set forth in more detail below. These Remarks will demonstrate that the rejected claims are not obvious over the Fesenko, Wittman and Blasse references because this invention's Sr_2RESbO_6 dielectric substrates and buffer layers provide advantageous dielectric constant and dielectric loss characteristics due to the polarizability of the

Sb^{5+} atom that are not taught or suggested by the references. Based on this Amendment, it is respectfully requested that the Examiner reconsider the obviousness rejections and that claims, as amended, be allowed and pass to issue.

Applicant's attorney wishes to briefly describe the revisions, clarifications and corrections to the specification and claims made by this Amendment. The specification was revised in three places to indicate that dielectric substrate and buffer layer devices were disclosed and claimed and to correct a capitalization error, without adding any prohibited new matter. Similarly, dependent claims 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40 and 43 have been revised to recite the phrase "further comprising" instead of "wherein." No other changes have been made to the claims. It is respectfully submitted that these revisions, clarifications and corrections to the specification and claims have not added any prohibited new matter. It is respectfully requested that the claims, as amended, be allowed and pass to issue.

Before responding to the prior art rejections, Applicant's attorney wishes to briefly describe this invention's Sr_2RESbO_6 dielectric substrates and buffer layers. Claim 1 recites dielectric substrates having the general formula Sr_2RESbO_6 where RE is selected from a Markush group of 14 rare earth metals. Claim 2 recites heating temperature ranges of 1400° C to 1600 ° C, dielectric constant ranges between 4.1 to 16.3, a low dielectric loss in the range of less than 1×10^{-3} to 9×10^{-3} without a phase transition and that the claim 1 general formula includes an Sb^{5+} constituent atom with a polarizability of about 1.2 $Å^3$. Claims 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39 and 42 are dependent claims reciting dielectric substrates composed from one of the claim 1 rare earth metals, such as Sr_2LuSbO_6. Dependent claim 4, as amended, recites more specific characteristics of the Sr_2LuSbO_6 dielectric substrate such as being constructed in bulk form, having a low dielectric constant of 15.1 and a low dielectric loss of less than 1×10^{-3}. Similarly, the other claims depending from claims 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39 and 42 recite more specific characteristics of the dielectric substrates in those claims. Claim 50 is similar to claim 1 and recites a buffer layer having the general formula Sr_2RESbO_6 where RE is selected from a Markush group of 14 rare earth metals. The specification describes the polarizability of the Sb^{5+} constituent atom from the general formula as being a significant feature that was neither taught nor disclosed by the prior art. It is respectfully submitted that the Fesenko,

Wittman and Blasse references neither teach nor disclose this invention's Sr_2RESbO_6 dielectric substrates and buffer layers, the polarizability of the Sb^{5+} atom and the advantageous dielectric constant and dielectric loss characteristics of those devices. It is respectfully requested that the Examiner reconsider these obviousness rejections, and that the claims, as amended, be allowed and pass to issue.

The Examiner rejected claims 1-4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43 and 50 under 35 USC § 103 as being obvious over an article by Fesenko entitled "Synthesis and Study of A2Sb5+O6 and A3Sb25+B'O9-type Ternary Oxides with Perovskite Structure." According to the Examiner, the article teaches the claimed compounds which would have dielectric characteristics since stoichiometry of the taught compounds is the same as that claimed and thus would function as a dielectric substrate. He also stated that when the Examiner finds a substantially similar product in the applied prior art, then the burden of proof shifts to the Applicants to establish that their product is patentably distinct, citing In re Brown, 172 USPQ 685, In re Fessmann, 180 USPQ 324, In re Spada, 911 F.2d 705, 15 USPQ 2d 1655 (CAFC 1990), In re Fitzgerald, 619 F.2d 67, 205 USPQ 594 (CCPA 1980), In re Best, 562, F.2d 1252, 195 USPQ 430 (CCPA 1977) and MPEP 2112, Requirements of Rejection Based on Inherency. These rejections are hereby traversed.

It is respectfully submitted that this invention's Sr_2RESbO_6 dielectric substrates and buffer layers are not obvious because of the polarizability of the Sb^{5+} atom and other differences from the prior art and that an obviousness rejection needs to be supported by substantial evidence on the record. This invention's Sr_2RESbO_6 dielectric substrates and buffer layers are not obvious under 35 USC § 103(a) over the Fesenko article entitled "Synthesis and Study of A2Sb5+O6 and A3Sb25+B'O9-type Ternary Oxides with Perovskite Structure," as best understood, because that article's abstract neither teaches nor suggests this invention's Sr_2RESbO_6 dielectric substrates and buffer layers, their advantageous dielectric constant and dielectric loss characteristics, the polarizability of the Sb^{5+} atom and other recited elements.

Claims 1-2 recite dielectric substrates having the general formula Sr_2RESbO_6 where RE is selected from a Markush group of 14 rare earth metals, a heating temperature range of 1400° C to 1600 ° C, dielectric constant ranges between 4.1 to 16.3, a low dielectric loss in the range of less

than 1 x 10^{-3} to 9 x 10^{-3} without a phase transition and including an Sb^{5+} constituent atom with a polarizability of about 1.2 Å^3. The Fesenko reference, as best understood, is primarily concerned with cubic perovskite structure and its ordered or disordered form. Fesenko does not disclose the present invention's substantial differences in heat treatment, density, dielectric constant, dielectric loss, lattice parameter, polarizability of the Sb^{5+} atom and crystal structure. Fesenko neither teaches nor discloses the advantageous and unexpected dielectric constant and dielectric loss characteristics of this invention's Sr_2RESbO_6 dielectric substrates and buffer layers and the relationship of the polarizability of the Sb^{5+} atom to these important properties.

The Sb^{+5} constituent atom having a polarizability of 1.2 Å^3 is adequately supported by specification page 5, line 17 to page 6, line 5 as follows:

> It is important to note the significant relationship between the higher temperatures of 1400° C and 1600° C for 20-50 hours and the densities attained with these materials. The papers "Dielectric constants of yttrium and rare-earth garnets, the polarizability of gallium oxide and the oxide additivity rule," by R.D. Shannon et al. and " Dielectric polarizabilities of ions in oxides and fluorides," by R.D. Shannon established that the dielectric constant of a well-behaved complex oxide can be predicted by knowing the polarizability of the atoms making up the structure and the volume of the structure. <u>From these relationships it is straightforward to understand that the dielectric constant of a material is sensitive to the sample's density</u>. For instance, the more porous the sample (i.e. less dense), the lower the dielectric constant will be (air has a dielectric constant of roughly 1.00 for a sample density approaching 0%). When comparing two samples of the same compound with equivalent densities, e.g. both 100 % dense, the same dielectric constant would be expected. However, when comparing two material samples with different densities and the same lattice parameter, the dielectric constant measurements can be appreciably different, again dependent on the difference in sample density.
>
> <u>Further, the polarizability of Sb^{5+}, which is a constituent atom of the materials used to fabricate the compounds and devices of the present invention, has not been previously known</u>. The materials of the present invention all include at least one Sb^{5+} constituent atom with a polarizability of about 1.2 Å^3. <u>Therefore, prior art references that</u>

do not account for significant factors such as polarizability and material density have not predicted the advantageous dielectric constants of the materials of the present invention.

(Emphasis Supplied)

Additionally, the polarizability of the Sb^{+5} constituent atom has previously been considered a patentably significant difference between the prior art and claims in another patent application filed by the inventors herein and other co-inventors for a dielectric substrate with the general formula $A_4MeSb_3O_{12}$. During the prosecution of U.S. Patent Application No. 09/371,166, which resulted in U.S. Patent No. 6,084,246 being issued, the Examiner in that case made the following statement in the Reasons For Allowance section of the first Office Action dated February 14, 2000, Paper No. 5, page 5:

> The prior art does not disclose the limitations of these claims, particularly $A_4MeSb_3O_{12}$ compound with an Sb^{+5} constituent atom having a polarizability of about 1.2 Å^3

Furthermore, it is respectfully submitted that this invention's Sr_2RESbO_6 dielectric substrates that exhibited a cubic ordered perovskite structure differed from prior art structures because of this invention's substantially longer high temperature heating time. Specification page 6, lines 6-14 states:

> Additionally, it should be noted that only two of the compounds in the series Sr_2RESbO_6 were cubic: Sr_2LuSbO_6 and Sr_2LaSbO_6, both being ordered with a 1:1 distribution of RE and Sb on B sites, with a perovskite ideally being ABO_3... It is also noted that the cubic ordered perovskites prepared in connection with the present invention are quite different from those found in the literature because the compounds disclosed herein were prepared at higher temperatures for a longer period of time.

(Emphasis Supplied)

The Examiner cited In re Brown, In re Fessmann, In re Spada, In re Fitzgerald, In re Best, and MPEP 2112 for the proposition that finding a substantially similar product shifts the burden of proving patentability to the Applicants. As discussed elsewhere, it is respectfully submitted that the references do not disclose similar products. However, assuming arguendo that the references actually disclose "substantially similar" products, it is respectfully submitted that these older Board of Patent Interference cases and MPEP 2112 may require reevaluation in light

of the Supreme Court's decision in Dickinson vs. Zurko, 527 U.S. 150, 119 S. Ct. 1816, 144 L. Ed. 2d 143, 50 USPQ 2D (BNA) 1930 (1999) (Zurko III) and subsequent decisions by the court of Appeals for the Federal Circuit. The Supreme Court in Zurko III held that the PTO is an administrative agency bound by the Administrative Procedure Act, 5 USC § 706(2)(E), and that appellate review of Board of Patent Appeals and Interferences decisions must be conducted within the APA's statutory framework. The Federal Circuit also ruled that the substantial evidence standard of review would be used for Board fact-finding, In re Gartside, 203 F. 3d 1305, 53 USPQ 2d 1769 (CAFC 2000). In the most recent decision on remand, In Re Zurko, 258 F.3d 1379; 2001 U.S. App. LEXIS 17219; 59 U.S.P.Q.2D (BNA) 1693 (Zurko IV)(CAFC 2001), the Federal Circuit remanded the case to the PTO and ruled that the Board is not permitted to make assumptions of fact concerning "basic knowledge" or "common sense" to one of ordinary skill in the art and an "unsupported assessment of the prior art." 258 F.3d 1379, 1385; 2001 U.S. App. LEXIS 17219, 14. Similarly, in Rapoport vs. Dement, 254 F. 3d 1053, 59 USPQ 2d 1215 (CAFC 2001), a Federal Circuit appeal from a Board of Patent Appeals and Interferences interference decision concerning the obviousness of a particular sleep apnea compound, the Federal Circuit held that factual issues such as inherency require substantial evidence on the record to support the Board's finding. It is respectfully submitted that the more cases require substantial evidence on the record to support an obviousness rejection based on inherency.

For these reasons, it is respectfully submitted that the Fesenko reference neither teaches nor discloses this invention's advantageous dielectric constant and loss characteristics, the significant relationship between the higher temperatures of 1400° C and 1600° C for 20-50 hours and the densities attained with these materials, the relationship between higher heating temperatures and certain cubic perovskite structures of the present invention and the Sb^{5+} constituent atom with a polarizability of about 1.2 $Å^3$.

The Examiner also rejected claims 1-4, 6, 7, 18, 19, 24, 33, 34, 39, 40, 42, 43 and 50 for obviousness under 35 USC § 103 over an article by Wittmann et al. entitled "On The Ordering Of B^{III} and M^{V} In Perovskites of the Type $A_2^{II}B^{III}M^{V}O_6$." According to the Examiner, the Wittmann et al. reference teaches the claimed compounds which would have dielectric characteristics since stoichiometry of the taught compounds is the same as that claimed and thus would function as a

dielectric substrate. Citing the previous cases, the Examiner also stated that the burden of proving that their product is patentably distinct shifted to the Applicants.

It is respectfully submitted that this invention's Sr_2RESbO_6 dielectric substrates and buffer layers are not obvious due to the polarizability of the Sb^{5+} atom and other differences and that the Wittmann reference neither teaches nor suggests this invention's Sr_2RESbO_6 dielectric substrates and buffer layers, their advantageous dielectric constant and dielectric loss characteristics, the polarizability of the Sb^{5+} atom and other claim elements. As discussed above, claims 1-4, as amended, recite dielectric substrates having the general formula Sr_2RESbO_6, heating temperature, dielectric constant and low dielectric loss ranges, including an Sb^{5+} constituent atom with a polarizability of about 1.2 Å^3 and more specific heating temperature, dielectric constant and low dielectric loss ranges for the Sr_2LuSbO_6 compound. It is respectfully submitted that the Wittmann reference is primarily concerned with cubic perovskite structure, detecting deviations from a complete order between B^{III} and Sb^{V} with intensity calculations, oscillation spectroscopy investigations and recording the infrared and Raman spectra. In fact, the Wittmann article teaches away form this invention because he was unable to prepare the Sr_2LaSbO_6 chemical compound. The Wittmann reference does not disclose the present invention's significant differences in heat treatment, density, dielectric constant, dielectric loss, lattice parameter, polarizability of the Sb^{5+} atom and crystal structure, therefore it neither teaches nor discloses the advantageous and unexpected dielectric constant and dielectric loss characteristics of this invention's Sr_2RESbO_6 dielectric substrates and buffer layers and the relationship of the polarizability of the Sb^{5+} atom to these important properties for purposes of a 35 USC § 103(a) obviousness rejection. Finally, the earlier comments regarding the burden of proof and the need for substantial evidence on the record based on Zurko III, Zurko IV and Rapoport are hereby incorporated by reference.

Therefore, it is respectfully submitted that the Wittmann reference neither teaches nor discloses this invention's advantageous dielectric constant and loss characteristics, the significant relationship between the higher temperatures of 1400° C and 1600° C for 20-50 hours and material densities attained, the relationship between those higher temperatures and certain cubic

perovskite structures of the present invention and the Sb^{5+} constituent atom with a polarizability of about 1.2 Å^3.

The Examiner rejected claims 1, 2, 30, 31 and 50, which recite dielectric substrates and buffer layers composed of Sr_2GdSbO_6 under 35 USC § 103 as being obvious over an article by Blasse entitled "New Compounds With Perovskite-Like Structures." According to the Examiner, the Blasse reference teaches the claimed compounds which would have dielectric characteristics since stoichiometry of the taught compounds is the same as that claimed and thus would function as a dielectric substrate.

It is respectfully submitted that this invention's Sr_2GdSbO_6 dielectric substrate and buffer layer is not obvious due to the polarizability of the Sb^{5+} atom and other differences and that the Blasse reference neither teaches nor suggests this invention's Sr_2GdSbO_6 dielectric substrate and buffer layer, their advantageous dielectric constant and dielectric loss characteristics, the polarizability of the Sb^{5+} atom and other claim elements. Claims 1-2 recite dielectric substrates with the general formula Sr_2RESbO_6, heating temperature, dielectric constant and low dielectric loss ranges and including an Sb^{5+} constituent atom with a polarizability of about 1.2 Å^3, and claims 30-31, as amended, recite more specific heating temperatures, dielectric constant and low dielectric loss figures for Sr_2GdSbO_6 dielectric substrates. The Blasse reference reports on six new compounds prepared after studying ternary metal oxides with perovskite-like structures. This reference briefly describes the perovskite structure of these six particular compounds and does not disclose any of the compounds' other features or properties. The Blasse reference does not disclose the present invention's significant differences in heat treatment, density, dielectric constant, dielectric loss, lattice parameter, polarizability of the Sb^{5+} atom and crystal structure, therefore it neither teaches nor discloses the advantageous and unexpected dielectric constant and dielectric loss characteristics of this invention's Sr_2GdSbO_6 dielectric substrate and buffer layer and the relationship of the polarizability of the Sb^{5+} atom to these important properties for purposes of a 35 USC § 103(a) obviousness rejection. Also, the earlier comments regarding the burden of proof cases cited by the Examiner and the need for substantial evidence on the record based on Zurko III, Zurko IV and Rapoport are hereby incorporated by reference. Thus, it is respectfully submitted that the Blasse reference neither teaches nor discloses the Sr_2GdSbO_6

advantageous dielectric constant and loss characteristics, the significant relationship between the higher temperatures of 1400° C and 1600° C for 20-50 hours and the densities attained with these materials, the relationship between higher heating temperatures and certain cubic perovskite structures and the Sb^{5+} constituent atom with a polarizability of about 1.2 Å^3.

For these reasons, it is respectfully submitted that the Fesenko, Wittmann and Blasse references neither teach nor disclose this invention's advantageous dielectric constant and loss characteristics, the significant relationship between the higher temperatures of 1400° C and 1600° C for 20-50 hours and the densities attained with these materials, the relationship between higher heating temperatures and certain cubic perovskite structures of the present invention and the Sb^{5+} constituent atom with a polarizability of about 1.2 Å^3. It is respectfully requested that the Examiner reconsider these obviousness rejections, and that the claims, as amended, be allowed and pass to issue.

Should the Examiner require further information, the Examiner is invited to telephone the applicants' attorney at the telephone number listed below.

11/15/2002
DATE

Respectfully Submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: **TAUBER et. al**
Serial No.: **09/845,108**
Filed: **April 26, 2001**

37 CFR § 1.121(b)(iii) SPECIFICATION REPLACEMENT PAGES

Delete the paragraph at page 2, lines 12-14 and replace the deleted paragraph with the following replacement paragraph:

The invention relates in general to new and useful devices composed of rare earth metal containing compounds, and in particular to new [uses for] dielectric substrates and buffer layers composed of compounds of the general formula Sr_2RESbO_6 where RE is a rare earth metal.

Delete the paragraph at page 12, line14 to page 13, line 6 and replace the deleted paragraph with the following replacement paragraph:

The real part of the dielectric constant is calculated from the shift in resonance frequency of the cavity due to the sample, and the imaginary component is calculated from a change in cavity Q. The accuracy of these measurements depends upon two general sources of error: 1) [The] the accuracy of the cavity characterization; and 2) the material properties such as density and uniformity of shape. The error due to the cavity characterization results in an accuracy of approximately ±2% for the real part of the dielectric constant, and limits the resolution of the loss tangent (the imaginary component divided by the real component of the dielectric constant) to approximately 0.001. The error due to material properties and sample shape can be considerably greater than the cavity characterization error, particularly the error due to low material density; hence the densities of bulk materials are reported in the Density GM/CC column of TABLE I.

Delete the paragraph at page 14, lines 8-9 and replace the deleted paragraph with the following replacement paragraph:

In addition to numerous [device uses] devices already disclosed throughout this

specification, the following examples illustrate two specific [uses] devices composed of [the] Sr_2RESbO_6 compounds [of] in accordance with this invention.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: **TAUBER et. al**
Serial No.: **09/845,108**
Filed: **April 26, 2001**

37 CFR § 1.121 (c)(1)(ii) CLAIM REPLACEMENT PAGES

4. (Amended) The dielectric substrate, according to claim 3, [wherein] further comprising:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 15.1; and

said dielectric substrate having a low dielectric loss of less than 1×10^{-3}.

7. (Amended) The dielectric substrate, according to claim 6, [wherein] further comprising:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 5.1; and

said dielectric substrate having a low dielectric loss of less than 1.0×10^{-3}.

10. (Amended) The dielectric substrate, according to claim 9, [wherein] further comprising:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 10.0; and

said dielectric substrate having a low dielectric loss of 2.0×10^{-3}.

13. (Amended) The dielectric substrate, according to claim 12, [wherein] further comprising:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 5.3; and

said dielectric substrate having a low dielectric loss of 1.6×10^{-3}.

16. The (Amended) dielectric substrate, according to claim 15, [wherein] further comprising:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 11.6; and

said dielectric substrate having a low dielectric loss of about 3.1 x 10^{-3}.

19. (Amended) The dielectric substrate, according to claim 18, [wherein] further comprising:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 11.2; and

said dielectric substrate having a low dielectric loss of less than 1.0 x 10^{-3}.

22. (Amended) The dielectric substrate, according to claim 21, [wherein] further comprising:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 12.9; and

said dielectric substrate having a low dielectric loss of 1.4 x 10^{-3}.

25. (Amended) The dielectric substrate, according to claim 24, [wherein] further comprising:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 7.1; and

said dielectric substrate having a low dielectric loss of 1.4 x 10^{-3}.

28. (Amended) The dielectric substrate, according to claim 27, [wherein] further comprising:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 16.3; and

said dielectric substrate having a low dielectric loss of 3.8×10^{-3}.

31. (Amended) The dielectric substrate, according to claim 30, [wherein] <u>further comprising</u>:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 12.1; and

said dielectric substrate having a low dielectric loss of less than 1.0×10^{-3}.

34. (Amended) The dielectric substrate, according to claim 33, [wherein] <u>further comprising</u>:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 13.6; and

said dielectric substrate having a low dielectric loss of less than 1.0×10^{-3}.

37. (Amended) The dielectric substrate, according to claim 36, [wherein] <u>further comprising</u>:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 10.9; and

said dielectric substrate having a low dielectric loss of 2.2×10^{-3}.

40. (Amended) The dielectric substrate, according to claim 39, [wherein] <u>further comprising</u>:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 14.6; and

said dielectric substrate having a low dielectric loss of less than 1.0×10^{-3}.

43. (Amended) The dielectric substrate, according to claim 42, [wherein] <u>further comprising</u>:

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having a low dielectric constant of 10.6; and said dielectric substrate having a low dielectric loss of 2.9×10^{-3}.